Wildcards in Excel

Wildcards in Excel are special characters used to perform flexible searches and pattern matching within text strings. They are particularly useful in functions that involve searching, filtering, or conditional checks. Excel supports three wildcard characters: the asterisk `*`, question mark `?`, and tilde `~`. Below is a detailed breakdown of their usage, examples, and best practices.

1. Types of Wildcards

A. Asterisk `*`

- **Purpose**: Matches **any number of characters** (including zero).
- **Example**:
  `=COUNTIF(A1:A10, "North*")`
  Counts all cells starting with "North" (e.g., "North", "Northeast", "Northern").

B. Question Mark `?`

- **Purpose**: Matches **exactly one character**.
- **Example**:
  `=COUNTIF(A1:A10, "A?C")`
  Matches "ABC", "A1C", or "A C" (3-character strings where the second character can be anything).

C. Tilde `~`

- **Purpose**: Escapes wildcards to search for literal `*`, `?`, or `~`.
- **Example**:
  `=COUNTIF(A1:A10, "*~**")`
  Counts cells containing an asterisk (e.g., "10%* discount").

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2. Functions That Support Wildcards

Wildcards work in functions that accept **criteria-based text searches**:

- **COUNTIF / COUNTIFS**
  `=COUNTIF(range, "A*")` → Counts cells starting with "A".
- **SUMIF / SUMIFS**
  `=SUMIF(range, "Error???", sum_range)` → Sums values where cells start with "Error" followed by 3 characters.
- **VLOOKUP / HLOOKUP**
  `=VLOOKUP("Prod*", table, 2, FALSE)` → Finds the first entry starting with "Prod".
- **MATCH**
  `=MATCH("?X", A1:A10, 0)` → Finds the position of a 2-character string ending with "X".
- **SEARCH** (partial support)
  While `SEARCH` does not directly use wildcards, you can combine it with `*`/`?`:
  `=IF(ISNUMBER(SEARCH("east", A1)), "Found", "Not Found")`.

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3. Practical Examples

A. Partial Matches in Lookups

```
=VLOOKUP("PRD-*", A1:B10, 2, FALSE)
```

Finds the first value in column B where column A starts with "PRD-".

B. Filtering Data with Wildcards

Use `FILTER` with `SEARCH` (case-insensitive) or `FIND` (case-sensitive):

```
=FILTER(A1:B10, ISNUMBER(SEARCH("urgent", A1:A10)))
```

Returns rows where column A contains "urgent".

C. Cleaning Data

Replace text containing wildcards:

```
=SUBSTITUTE(A1, "~*", "")  → Removes literal "*" from a cell.
```

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4. Advanced Techniques

A. Combining Wildcards

- `"A*Z"` → Matches "AZ", "AlphaZ", "A to Z".
- `"202?-Q?"` → Matches "2023-Q1", "2024-Q4".

B. Case Sensitivity

- Most functions (e.g., `COUNTIF`, `VLOOKUP`) are **case-insensitive**.
- Use `FIND` for case-sensitive searches:
  `=IF(ISNUMBER(FIND("X", A1)), "Found", "Not Found")`.

C. Dynamic Wildcards with Cell References

```
=COUNTIF(A1:A10, "*" & B1 & "*")
```

Counts cells containing the text in cell `B1`.

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5. Common Pitfalls

1. **Forgetting to Escape Wildcards**:
   To search for "?", use `~?`.
   Example: `=COUNTIF(A1:A10, "Why~?")` → Counts "Why?".
2. **Overusing `*`**:
   `"*"` alone matches **any text**, including empty cells. Use `"*?*"` to ensure at least one character.
3. **Mixing Wildcards with Numbers**:
   Wildcards work only with **text**. Convert numbers to text first:
   `=COUNTIF(TEXT(A1:A10, "0"), "12*")`.

6. Wildcards vs. Regular Expressions

Excel's wildcards are simpler than regex but less powerful:

Feature	Excel Wildcards	Regex
Match any character	`*`	`.*`
Match one character	`?`	`.`
Escape character	`~`	`\`
Case sensitivity	Mostly no	Configurable

7. Pro Tips

- **Conditional Formatting**: Highlight cells with wildcards:
  `=COUNTIF(A1, "*alert*")` → Highlights cells containing "alert".
- **Data Validation**: Restrict input using wildcards:
  Allow only codes like "ID-####":
  `=AND(LEFT(A1,3)="ID-", ISNUMBER(VALUE(MID(A1,4,4))))`.
- **XLOOKUP Wildcard Mode**:
  `=XLOOKUP("A*", lookup_array, return_array, , 2)` → Uses wildcard match mode.

8. Limitations

- Wildcards do **not** work in `FILTER` directly. Use `SEARCH` / `FIND` inside the formula.
- Not supported in mathematical functions (e.g., `SUM`, `AVERAGE`).